AMENDMENTS TO THE CLAIMS

Listing of the claims:

Following is a listing of all claims in the present application, which listing supersedes all previously presented claims:

1. (Currently Amended) A membrane-electrode structure comprising:

an anode electrode;

a cathode electrode; and

a polymer electrolyte membrane made of a sulfonated polyarylene based polymer and held between both electrodes, wherein,

said cathode electrode comprises an electrode catalyst layer containing a catalyst particle having the catalyst loaded on carbon particles, a pore forming member and an ion conducting polymer that is in contact with said polymer electrolyte membrane through said electrode catalyst layer, a ratio of the weight of the ion conducting polymer to the weight of the carbon particles falling within the range of from 1.4 to1.8, and

said electrode catalyst layer having pores formed therein by the pore forming member, and a total sum volume of the pores that have a pore diameter within a range of from 0.01 to 30 μm is, for each 1 mg of ~~equal to or greater than 6.0 μl/cm^2 mg~~ catalyst in the electrode catalyst layer and each 1 cm^2 of the surface area of the electrode catalyst layer opposite to the surface in contact with the polymer electrolyte membrane, within the range of 6.06 to 7.26 μl .

2. (Original) The membrane-electrode structure according to claim 1, wherein the pores formed by said pore forming member have a pore diameter distribution comprising a first peak falling within the pore diameter range from 0.01 to 0.1 μm and a second peak falling within the pore diameter range from 0.1 to 1.0 μm.

3. (Currently Amended and Withdrawn) A polymer electrolyte fuel cell in which in the membrane-electrode structure comprising:

an anode electrode];

a cathode electrode; and

a polymer electrolyte membrane made of a sulfonated polyarylene based polymer and held between both electrodes, wherein

a fuel gas is supplied to said anode electrode, an oxidant gas less than 50% in relative humidity is supplied to said cathode electrode and electric power is thereby generated under a low humidified condition, and wherein:

said cathode electrode comprises an electrode catalyst layer containing a catalyst particle having the catalyst loaded on carbon particles, a pore forming member and an ion conducting polymer that is in contact with said polymer electrolyte membrane through said electrode catalyst layer, a ratio of the weight of the ion conducting polymer to the weight of the carbon particles falling within the range of from 1.4 to1.8;

said electrode catalyst layer having pores formed therein by the pore forming member, and a total sum volume of the pores that have a pore diameter within a range of from 0.01 to 30 μm is, for each 1 mg of ~~equal to or greater than 6.0 μl/cm^2~~

~~mg~~ catalyst in the electrode catalyst layer and each 1 cm^2 of the surface area of the electrode catalyst layer opposite to the surface in contact with the polymer electrolyte membrane, within the range of 6.06 to 7.26 μl; and

the pores formed by said pore forming member have a pore diameter distribution comprising a first peak falling within the pore diameter range of from 0.01 to 0.1 μm and a second peak falling within the pore diameter range of from 0.1 to 1.0 μm, the height of said first peak being higher than the height of said second peak.

4. (Withdrawn) The polymer electrolyte fuel cell according to claim 3, wherein the ion conducting polymer contained in the electrode catalyst layer of said cathode electrode has a weight ratio falling within the range of from 1.2 to 1.8 in relation to said carbon particles.

5. (Withdrawn) The polymer electrolyte fuel cell according to claim 3, wherein the electrode catalyst layer of said cathode electrode is bonded by thermal transfer to said polymer electrolyte membrane, and the pore diameter distribution of the pores formed by said pore forming member in said electrode catalyst layer, before thermal transfer, comprises a third peak in the pore diameter range equal to or more than 5 μm, and wherein the height of said third peak falls within the range from 0.9 to 1.8 $\mu l/cm^2$ mg catalyst in terms of the pore volume.

6. (Currently Amended and Withdrawn) An electric appliance wherein a polymer electrolyte fuel cell is used in which:

in the membrane-electrode structure comprising an anode electrode, a cathode electrode and a polymer electrolyte membrane made of a sulfonated polyarylene based polymer and held between both electrodes, a fuel gas is supplied to said anode electrode, an oxidant gas less than 50% in relative humidity is supplied to said cathode electrode and electric power is thereby generated under a low humidified condition, said cathode electrode comprises an electrode catalyst layer containing a catalyst particle having the catalyst loaded on the carbon particles, a pore forming member and an ion conducting polymer of the weight ratio falling within the range from 1.0 to 1.8 in relation to said carbon particles, and is in contact with said polymer electrolyte membrane through said electrode catalyst layer;

said electrode catalyst layer has a total sum volume of the pores falling within the pore diameter range from 0.01 to 30 μm, of the pores formed by said pore forming member, which is, for each 1 mg of ~~equal to or greater than 6.0 μl/cm^2 mg~~ catalyst in the electrode catalyst layer and each 1 cm^2 of the surface area of the electrode catalyst layer opposite to the surface in contact with the polymer electrolyte membrane, within the range of 6.06 to 7.26 μl; and

the pores formed by said pore forming member have a pore diameter distribution comprising a first peak falling within the pore diameter range from 0.01 to 0.1 μm and a second peak falling within the pore diameter range from 0.1 to 1.0 μm, the height of said first peak being higher than the height of said second peak.

7. (Currently Amended and Withdrawn) A transport machine wherein a polymer electrolyte fuel cell is used in which:

in the membrane-electrode structure comprising an anode electrode, a cathode electrode and a polymer electrolyte membrane made of a sulfonated polyarylene based polymer and held between both electrodes, a fuel gas is supplied to said anode electrode, an oxidant gas less than 50% in relative humidity is supplied to said cathode electrode and electric power is thereby generated under a low humidified condition, said cathode electrode comprises an electrode catalyst layer containing a catalyst particle having the catalyst loaded on the carbon particles, a pore forming member and an ion conducting polymer of the weight ratio falling within the range from 1.0 to 1.8 in relation to said carbon particles, and is in contact with said polymer electrolyte membrane through said electrode catalyst layer;

said electrode catalyst layer has a total sum volume of the pores falling within the pore diameter range from 0.01 to 30 μm, of the pores formed by said pore forming member, which is, for each 1 mg of ~~equal to or greater than 6.0 μl/cm^2 mg~~ catalyst in the electrode catalyst layer and each 1 cm^2 of the surface area of the electrode catalyst layer opposite to the surface in contact with the polymer electrolyte membrane, within the range of 6.06 to 7.26 μl; and

the pores formed by said pore forming member have a pore diameter distribution comprising a first peak falling within the pore diameter range from 0.01 to 0.1 μm and a second peak falling within the pore diameter range from 0.1 to 1.0 μm, the height of said first peak being higher than the height of said second peak.

8. (Currently Amended) A polymer electrolyte fuel cell having a membrane-electrode structure comprising:

an anode electrode;

a cathode electrode; and

a polymer electrolyte membrane made of a sulfonated polyarylene based polymer and held between both electrodes, wherein

a fuel gas is supplied to said anode electrode, an oxidant gas of 50% or more in relative humidity is supplied to said cathode electrode and electric power is thereby generated under a highly humidified condition, and wherein

said cathode electrode comprises an electrode catalyst layer containing a catalyst particle having the catalyst loaded on carbon particles, a pore forming member and an ion conducting polymer that is in contact with said polymer electrolyte membrane through said electrode catalyst layer, a ratio of the weight of the ion conducting polymer to the weight of the carbon particles falling within the range of from 1.4 to1.8;

said electrode catalyst layer having pores formed therein by the pore forming member, and a total sum volume of the pores that have a pore diameter within a range of from 0.01 to 30 μm is, for each 1 mg of ~~equal to or greater than 6.0 μl/cm^2 mg~~ catalyst in the electrode catalyst layer and each 1 cm^2 of the surface area of the electrode catalyst layer opposite to the surface in contact with the polymer electrolyte membrane, within the range of 6.06 to 7.26 μl; and

the pores formed by said pore forming member have a pore diameter distribution comprising a first peak falling within the pore diameter range of from 0.01 to 0.1 μm and a second peak falling within the pore diameter range of from 0.1 to 1.0 μm, the height of said first peak being lower than the height of said second peak.

9. (Previously Presented) The polymer electrolyte fuel cell according to claim 8, wherein the ion conducting polymer contained in the electrode catalyst layer of said cathode electrode falls within the weight ratio range of from 1.4 to 1.6 in relation to said carbon particles.

10. (Original) The polymer electrolyte fuel cell according to claim 8, wherein the electrode catalyst layer of said cathode electrode is bonded by thermal transfer to said polymer electrolyte membrane, and the pore diameter distribution of the pores formed by said pore forming member in said electrode catalyst layer, before thermal transfer, comprises a third peak in the pore diameter range equal to or more than 5 μm, and wherein the height of said third peak is 0.18 μl/cm^2 mg catalyst or more in terms of the pore volume.

11. (Currently Amended) An electric appliance utilizing a polymer electrolyte fuel cell, the polymer electrolyte fuel cell comprising:

a membrane-electrode structure comprising:

an anode electrode;

a cathode electrode; and

a polymer electrolyte membrane made of a sulfonated polyarylene based polymer and held between both electrodes, wherein a fuel gas is supplied to said anode electrode, an oxidant gas of 50% or more in relative humidity is supplied to said cathode

electrode and electric power is thereby generated under a highly humidified condition, and wherein:

said cathode electrode comprises an electrode catalyst layer containing a catalyst particle having the catalyst loaded on carbon particles, a pore forming member and an ion conducting polymer that is in contact with said polymer electrolyte membrane through said electrode catalyst layer, a ratio of the weight of the ion conducting polymer to the weight of the carbon particles falling within the range of from 1.4 to1.8;

said electrode catalyst layer having pores formed therein by the pore forming member, and a total sum volume of the pores that have a pore diameter within a range of from 0.01 to 30 μm, is, for each 1 mg of ~~equal to or greater than 6.0 μl/cm^2 mg~~ catalyst in the electrode catalyst layer and each 1 cm^2 of the surface area of the electrode catalyst layer opposite to the surface in contact with the polymer electrolyte membrane, within the range of 6.06 to 7.26 μl; and

the pores formed by said pore forming member have a pore diameter distribution comprising a first peak falling within the pore diameter range of from 0.01 to 0.1 μm and a second peak falling within the pore diameter range of from 0.1 to 1.0 μm, the height of said first peak being lower than the height of said second peak.

12. (Currently Amended) A transport machine utilizing a polymer electrolyte fuel cell, the polymer electrolyte fuel cell comprising:

a membrane-electrode structure comprising:

an anode electrode;

a cathode electrode; and

a polymer electrolyte membrane made of a sulfonated polyarylene based polymer and held between both electrodes, wherein

a fuel gas is supplied to said anode electrode, an oxidant gas of 50% or more in relative humidity is supplied to said cathode electrode and electric power is thereby generated under a highly humidified condition, and wherein

said cathode electrode comprises an electrode catalyst layer containing a catalyst particle having the catalyst loaded on carbon particles, a pore forming member and an ion conducting polymer that is in contact with said polymer electrolyte membrane through said electrode catalyst layer, a ratio of the weight of the ion conducting polymer to the weight of the carbon particles falling within the range of from 1.4 to1.8;

said electrode catalyst layer having pores formed therein by the pore forming member, and a total sum volume of the pores that have a pore diameter within a range of from 0.01 to 30 μm is, for each 1 mg of ~~equal to or greater than 6.0 μl/cm^2 mg~~ catalyst in the electrode catalyst layer and each 1 cm^2 of the surface area of the electrode catalyst layer opposite to the surface in contact with the polymer electrolyte membrane, within the range of 6.06 to 7.26 μl; and

the pores formed by said pore forming member have a pore diameter distribution comprising a first peak falling within the pore diameter range from 0.01 to 0.1 μm a second peak falling within the pore diameter range from 0.1 to 1.0 μm, the height of said first peak being lower than the height of said second peak.